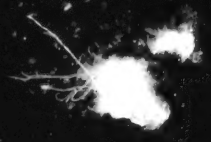
Clearinghouse Evaluators' Guide for Microcomputer - Based Courseware



Curriculum

Alberta

EVALUATOR'S GUIDE

FOR

MICROCOMPUTER-BASED

COURSEWARE

DEVELOPED BY

THE CLEARINGHOUSE

OF

ALBERTA EDUCATION

11160 Jasper Avenue
Edmonton, Alberta
T5K 0L2

1984

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I. INTRODUCTION

A. PURPOSE

Except in instructional situations where student programming is the primary activity, microcomputers can be used to assist the instructional process effectively only to the extent that good quality courseware is available. This Evaluator's Guide and the associated evaluation forms have been designed to assist teachers in identifying such courseware.

The development of the guide and the evaluation instruments has been based on the philosophical approach that description and evaluation of courseware should be separated. This has been done in the four major sections of the instrument - PEDAGOGICAL CONTENT, INSTRUCTIONAL FORMAT, TECHNICAL CHARACTERISTICS, and IMPLEMENTATIONAL SUPPORT.

B. PROCESS

The process of evaluation conducted by Alberta Education involves officials within the Program Development Division. As priorities are identified, the Clearinghouse solicits courseware from publishers for evaluation. Materials which pass an initial screen are described and assessed by a minimum of three different teachers who have the appropriate knowledge in the subject area under consideration and who have received training in the use of the evaluation instrument.

Courseware favourably reviewed by the teachers is evaluated further by the Program Development Division for congruency to the Programs of Studies and may be designated as a "Prescribed", "Recommended" or "Supplementary" learning resource for Alberta schools. Prescribed and Recommended materials are acquired and distributed through the School Book Branch of Alberta Education. All courseware evaluations are filed in the Clearinghouse and results are made available to Alberta schools.

C. DESCRIPTION OF THE INSTRUMENT

Courseware currently being published may come in a number of configurations.

a. A disk may contain a number of different "stand-alone" programs. For example, programs on spelling, identification of capital cities and review of basic number facts may be available all on one disk.

b. A disk may contain a number of programs tied together under the same basic goals but each having different objectives. For example, a disk may have four programs - addition, subtraction, multiplication and division of decimals.

c. A disk may contain one main program, for example, a simulation of a scientific experiment.

d. Two or more disks may be tied together into a package or series. For example, six disks reviewing arithmetic fundamentals may be combined into a single package with a management system.

As the basic item of purchase is the disk, IT IS THE DISK which has been made the basis of evaluation of this instrument.

There are two parts to the evaluation instrument - the **PROGRAM EVALUATION FORM** and the **DISK EVALUATION FORM.**

A **PROGRAM EVALUATION FORM** is generally completed for each stand-alone program on the disk. The form has descriptions and evaluations of the program's pedagogical content, instructional format and technical characteristics. Each stand-alone program on the disk may receive an evaluation that is independent of other programs on the disk.

A disk containing a number of programs tied together under a common goal will generally have each of the programs evaluated separately. However, when the programs are designed in such a manner that the only noticeable difference between them is in the pedagogical content and all other factors of instructional format and technical characteristics are identical, one PROGRAM EVALUATION FORM may be used for all the programs.

A **DISK EVALUATION FORM** is used to evaluate the overall DISK. It contains the identification of the disk (title, publisher, etc.), and a description and evaluation of the implementational support that is provided. It also contains observations of students, objectives, summative evaluation statements, suggestions to the producer and a final recommendation.

II. PROGRAM EVALUATION FORM

A. PEDAGOGICAL CONTENT

The pedagogical content of the disk includes an outline of the content range, sequence and depth along with other aspects of content such as accuracy and readability. Pedagogical content is the first thing that evaluators should look at - if the content is not appropriately presented, all the powerful potential of the computer is negated.

Programs with good content **RANGE** present material that is appropriate for the target audience to cover in one sitting. The program should also begin and end at a point that is appropriate for the skills/abilities of the intended users. An example of poor range for a primary class might be a program which starts with two digit by one digit multiplication but does not include any coverage of the content before that. Another example of poor range might be a program that attempts to teach the solution of linear equations from "2X = 4" up to "3(X - 6) = 5(4 - 2X) - (X - 6)" in one sitting.

Programs which have been designed to instruct and/or to provide practice should have a content **SEQUENCE** that will enable the user to learn the skill/concept. Common faults include the excessive size of incremental steps and the absence of an easy to difficult sequence. An example of poor sequence might be the program which takes the student from an introduction to fractions to addition of fractions without any work on equivalence. A drill designed to review basic addition facts might be considered to have poor sequence if all students were required to work through a sequence of 10 levels, each with 10 questions before they arrived at the questions that were appropriate to their grade level. It should be noted that not all programs require a sequential development and evaluators will have to base their assessment on the intents of the program.

DEPTH refers to the intensity with which content is presented or practiced and its effectiveness must be measured against user needs and program intents. Poor depth such as insufficient instruction and/or insufficient practice is a common, major weakness. An example of poor depth would be requiring users, new to a skill, to do only two exercises before being advanced to the next skill level. Other examples of poor depth are showing only one example of an operation or providing only one screen page of explanation when classroom experience would indicate that extensive instruction/practice is necessary.

While **CONTENT ACCURACY** is usually satisfactory, programs will occasionally have an error, e.g. in a mathematical or scientific formula. It is more common to find inaccurate simulations such as one based on a model that has been so simplified as to make it misleading.

Courseware with poor **READABILITY/CLARITY** would typically have vocabulary beyond the target audience's reading level, overly complicated sentence structure, unduly long sentences or excessive quantity of text.

PEDAGOGICAL CONTENT DESCRIPTION

Write narrative statements which will describe the following aspects of the content.

Program Contents

Describe the pedagogical content of the program (topics, skills, concepts).

1. What are the topics/skills/concepts covered in the program? (range)

2. What is the progression of the presentation? How are the units ordered? (sequence)

3. Describe the depth of treatment. What does the treatment include? (explanations, rules, examples, illustrations, drills, tests, etc.)

Example: This program covers three types of addition of fractions. Students begin with addition of common fractions with the same denominators, proceed to addition of fractions where one fraction has a denominator that is a factor of the other (e.g. 2 and 6, 3 and 12) and finish the program with addition of fractions with completely different denominators (e.g. 3 and 4 or 5 and 7). Improper and mixed fractions are not included in the program. The presentation of each topic includes one page of introduction, two examples and a brief drill. A statement of rules is available. The program ends with a test on all three skills.

Example: The program covers four job topics -attitude, work habits, task performance and interpersonal relationships. Each is presented in two or three pages of text followed by 5 multiple choice questions. A true/false 10 item test checks student comprehension.

Example: The program covers the different parts of the newspaper and the role that each plays in communicating to the public. The user selects from six choices at the menu (local news, editorial page, sports, leisure, business and ads). Each lesson contains an explanation of the purpose of the section, sample pages and reference to support materials. Multiple choice questions also test the student's understanding of the content. After the student has shown mastery of all six programs, an optional 10 item drill in game format provides practice in identifying the appropriate location of various articles.

PEDAGOGICAL CONTENT EVALUATION

Write narrative statements which will evaluate the content described earlier. The following questions are provided to assist you in supplying evaluative comments.

Range

1. Is the range of the content appropriate for the target audience? Is the student's attention span exhausted by the time a "unit" is completed?

2. Is the range of the content effective in achieving the intents of the program? Is sufficient content covered? Is too much covered?

Sequence

3. Is the sequence of presentation appropriate for the target audience?

   - Is the size of the increment appropriate?
   - Is the content sequence effectively and appropriately designed (e.g. easy to difficult, concrete to abstract, random mix)?

4. Is the sequence effective in achieving the intents of the program?

5. Where appropriate, can the user enter into the sequence at intermediate steps or must (s)he always start at the beginning?

6. Does the sequence remain consistent/appropriate during and after branching?

Depth

7. Is the depth appropriate for the target audience?

8. Is the depth effective in achieving the intents of the program?

   - Are definitions and explanations available where necessary?
   - Are definitions and explanations effective?
   - Does the instruction have an appropriate amount of detail to be effective?
   - Is there a sufficient number of examples, illustrations, exercises, etc.?
   - Is the user given an appropriate number of opportunities to use the concept?
   - Is the concept/skill presented an appropriate number of times?

Accuracy

9. Is the content accurate? Does it contain factual errors, an invalid model in a simulation, an oversimplified model or series of examples, inaccurate displays?

10. Is the content current?

Bias	11. Is the content balanced or biased? - e.g. social class/social role reference? - e.g. ethnic/racial references? - e.g. reference to sexual roles? - e.g. references to violence? - e.g. age portrayals? - e.g. stereotyping? Are there unfair or inaccurate judgements? Does it nurture the development of a positive self-concept? Does it contain Canadian data where relevant? Is the content metricated where appropriate?
Readability	12. Are vocabulary, sentence structure, sentence length, quantity of text and general readability appropriate for the target audience?
	13. Is the content presented in a clear and concise manner which is appropriate for the target audience?
Relevance	14. Are interest levels, visual images and levels of abstraction relevant for the target audience?
Media	15. Is the content appropriate to the medium? Is it best taught on a computer or through some other medium? Should other media be used in conjunction with the computer?

B. INSTRUCTIONAL FORMAT

Instructional Format sections focus on the utilization of the capabilities of the computer in presenting the pedagogical content described and evaluated earlier. These sections cover such features as interaction, questioning technique, feedback, evaluation, branching and methods of control.

If the capabilities of the computer to individualize instruction are to be used fully, the student must be given an opportunity to interact with the program and (s)he must find this INTERACTION reasonably easy to accomplish. Evaluating the effectiveness of the interaction is partly an inquiry into whether the user's attention will be distracted from his/her study of the pedagogical content that is being presented by an unnecessarily complicated mode of interaction and partly an assessment of the value of that interaction in promoting the learning. Poor interaction is most commonly found in tutorials, where the user tends to turn pages only, and in 'educational games' where the means of input often can be overly complicated. Examples of poor interaction may be found in programs which:

- have unduly complicated entry methods which emphasize keyboard manipulation skills to the detriment of the content skills being presented;
- have inconsistent input methods;
- have the user frequently pressing the space bar rather than interacting with the program in a meaningful way;
- have the user only passively involved in the program.

If a computer's full capabilities are to be effectively utilized, tutorials and drills must advance beyond the typical textbook/drill sheet approach. QUESTIONING TECHNIQUES that can enhance educational software are:

- Where appropriate, drill questions should be posed in an unpredictable pattern. Additionally, if the drill is used again, the order of the questions should be different.
- Questions with which the user has had trouble can be stored and re-presented to the student during the drill or upon its completion.
- It is not unusual in many programs to find the same question reappearing immediately or shortly after it was successfully answered. The program should ensure that this does not happen.

The design of appropriate FEEDBACK techniques is critical in making full use of the computer's capabilities but unfortunately most of the feedback procedures commonly used consist solely of the provision of the correct answer. As a result, many programs provide nothing more than what is available in a textbook with the answers in the back.

a. In evaluating the user's input, the program should ensure that a correct judgement has been made. This includes not only ensuring that the correct answer is accepted but also that slight differences in format are also accepted (with or without a cautionary note to the student). For example:

   i. a program should not reject "0.5" in favour of ".5";
   ii. a program should not reject "50 %" in favour of "50%" (inserted space);
   iii. "cat" should not be rejected for " cat" or "cat " (leading or trailing space).

b. Feedback should be motivational and sensitive to the user's needs. Significant advantages of CAI are the infinite patience and the privacy with which interaction occurs. These are negated by:

   i. a comment such as "You aren't doing very well; call your teacher";
   ii. a comment such as "You haven't put much thought into this, have you?"
   iii. a comment such as "Error! Error! Error!"
   iv. loud 'raspberries' for incorrect answers;
   v. unduly time consuming, repetitive, positive graphic rewards.

c. Cues and prompts can be given after a wrong answer to assist the student in understanding his/her error. A comment such as "Did you forget to move the decimal?" is much more effective than "Wrong".

d. If a computer program is to be more than a textbook with answers in the back, the user has to be given some help when an error is made. Corrective feedback showing the steps in the solution or re-explaining the concept is more helpful than merely telling the student the correct answer was "present participle".

e. Negative feedback should not be more attractive than the positive, e.g. a student may purposely enter incorrect answers in order to see a boulder fall into a pit and "squash" a graphical figure.

f. Summary feedback should be provided after the user has completed the drill or tutorial.

The inclusion of EVALUATION TECHNIQUES such as pre-tests and post-tests within a program can enhance its potential use considerably. Having students take a test before starting on some educational software would allow the teacher to filter out those students who are not yet ready for the content or those who have already mastered it. Post-tests are equally important as their results will indicate who did or did not master the content. Poorly designed pre-tests/post-tests would have inappropriate criteria and/or criteria that can not be changed by the teacher or questions that do not reflect the intents and content of the program.

The computer's effectiveness in individualizing instruction is greatly enhanced through the inclusion of BRANCHES within a program. An effective branch would provide for individual needs by presenting suitable remedial/enrichment content. Entry into and exit out of the branch should be suitably controlled by the user or the teacher. For example, automatic entry into a remedial branch after 2 errors might be disadvantageous for a student who made input errors.

The computer's effectiveness in individualizing instruction can be enhanced by giving the student/teacher appropriate CONTROL over some program features. It is generally expected that the student should have control over the pace of the presentation - this is usually achieved by pressing the space bar or return key. The appropriateness of other types of control will vary according to the age of the target audience and the ease with which control is implemented.

INSTRUCTIONAL FORMAT DESCRIPTION — Write narrative statements which will describe the following aspects of instructional format.

Student Interaction — Describe the student interaction that is required in the program.

1. What types of student interaction are there? (multiple choice entry, input of answer, "press return", timed responses, calculator function, ability to work a question out on the screen, etc.)

2. Comment on the frequency of interaction.

   Example: Student interaction in this program consists of pressing the space bar approximately 25 times and entering correct multiple choice responses in the drill section (5 questions).

   Example: Student interaction in this program consists of menu selections, page turning devices and answer inputs in the drill section. In the menu, the student is asked to enter the name of the program section desired. During the explanation, (10 pages), the student can go forward or backward by using the right or left arrow keys. The drill questions require the student to enter the correct numerical answer along with the % sign.

Questioning Techniques

Describe the manner in which the program selects questions. (For example, randomly, randomly from a limited data bank, in a preprogrammed order, in a predictable sequence, from a teacher created file, etc.)

Feedback Techniques

Describe the feedback techniques. Some questions that may be answered are:

1. When is feedback provided? (after all user responses, when user response is wrong, randomly on correct responses, etc.)

2. What type of feedback is provided? (e.g. graphics, text, audio, combination, etc.)

3. What content is included in the feedback? (e.g. general message, specific hints depending upon the error, the correct answer, a restatement of the correct answer, explanation of incorrect response, presentation of new information, etc.)

4. What is the extent of the variety of the feedback? (e.g. The same phrase "try again" is used after each incorrect response.)

5. Is quantitative feedback provided? (e.g. You got 9 questions correct out of 20.)

   Example: There are two types of feedback employed. On inputting a correct answer, the student receives a brief congratulatory message chosen randomly from approximately 10 statements. If an incorrect response is entered, the student is first told to "try again". If (s)he is wrong on the second attempt, the correct answer is shown. Quantitative feedback is given at the end of the drill.

Example: Graphical and audio feedback are employed throughout the program. Correct answers are rewarded with an extensive graphical picture (4 pictures available). Incorrect answers are punished by a buzzing sound and a large "X" which flashes on and off the screen.

Evaluation Techniques

Describe the evaluation techniques that are used to determine the student's success in the program.

1. Is there a pre-test or a post-test?

2. What are the criteria for success? Who sets the criteria?

Note that within this context, a drill is not an evaluation technique. A drill presents questions, often in a structured way, to give the user practice in a particular skill. Often, more than one attempt at a question is given and hints may also be provided. However, a test determines if the practice of the skill, the involvement of the student in the program, has been or is likely to be successful. Questions are not structured to lead a student towards more difficult questions, only one chance is given and feedback is limited to an indication of right or wrong.

Branches

Describe the branches that exist within the program. What types of branches are available to the user? Is the program linearly sequenced or is there provision for review, remediation, enrichment, help, etc.?

Types of Control

Describe the type of control that is used with each of the following: Sequence, Rate and Amount.

There are three types of control - PROGRAM, TEACHER and USER. Program control is based on pre-set criteria built into the program while teacher and user controls are based on entries made during the operation of the program. If teacher or student control is possible, describe how this is done (i.e. through a menu, management system, changing the program listing, etc.).

Sequence refers to the path of the user through the content described earlier. For example: Sending a student to a remedial loop automatically if (s)he makes a certain number of errors is program control. User control gives the student the opportunity to go to a particular part of the program, e.g. skip the explanation and go straight to the drill. Teacher control allows the teacher to specify, before a student begins the program, what parts of the program (s)he is to do.

Rate refers to the time allowed to read each display and to answer questions.

Amount refers to the amount of material that is presented in any one branch and how it is controlled. For example, the number of questions done, the number of examples seen, the number of pages read or re-read. Indicate the presence of any other user/teacher control features. (For example: timing of input, type of feedback, frequency of feedback, randomization of feedback, content of feedback, mastery level, speed of character generation, content of the post test.)

Example:

The sequence is controlled by the user through menu selections. Once into the program however, the sequence is controlled by the program.

The rate is controlled by the user by pressing the space bar.

The amount is controlled by the program or by the teacher. Students will generally all do twenty questions, however, the management system allows the teacher to set the number from 10 - 30 for individual students or for the class as a whole.

INSTRUCTIONAL FORMAT EVALUATION

Write narrative statements which will evaluate the instructional format described earlier. The following questions are provided to assist you in supplying evaluative comments.

Student Interaction

1. Is the student interaction appropriate for the target audience?

   - Can the target audience interact with the program easily?
   - Does the method of interaction detract the user's attention from the learning process?
   - Does the time required to complete the program exceed the attention span and/or physical endurance of the intended users?
   - If there is a time limit, is the concept of timing appropriate to the target audience?

2. Does the program contain a method of inquiry that promotes learning?
   - Is the student encouraged/permitted to learn through manipulation of the content rather than by simply passively reviewing facts? (e.g. manipulating a variable to verify or formulate a theory.)

3. Is the student interaction effective?

   - Is there sufficient interaction to meet the intents of the program? Does the student participate or just watch?
   - Does the interaction promote learning?
   - Is the type of interaction appropriate for the content and the intents of the program? (e.g. using multiple choice inputs, true/false, etc.)
   - Is the type of interaction consistent?
   - Is the student given appropriate directions as to the specific forms of input needed?
   - Is the program tolerant in accepting student inputs? (e.g. "Y" instead of "YES", slight misspellings, equivalent numerical answers such as 3.0 for 3, etc.)
   - Is the time limit appropriate? Can it be controlled by the student/teacher?
   - Is the entry of the user's input apparent to the user? Is it acknowledged where necessary?
   - Does the program respond satisfactorily to unexpected entries of space bar, alphabetic or numeric inputs?
   - If the program is designed for paddle inputs, does it also allow keyboard entry? Is a check made for type of entry to be used?
   - Where appropriate, does the program contain a calculator function and/or can the user work questions out on the screen?
   - Does the program allow correction of incorrect entries? Can this be easily done?
   - Does the program accept input at an appropriate rate?

Questioning Techniques

4. Are questions/questioning techniques appropriate to the target audience?

5. Is the questioning technique effective?

   - Are questions appropriate to the content?
   - Are questions effectively randomized, placed in a fixed sequence, drawn appropriately out of a data bank or repeated where necessary?
   - Are cueing techniques (hints/prompts/faded prompts, etc.) used effectively?
   - Are the number of trials appropriate?

Feedback Techniques

6. Is the feedback appropriate to the target audience?

   - Is the form of the feedback (graphics, reading level, sound, etc.) appropriate to the target audience?
   - Is the content of the feedback appropriate?

DISK EVALUATION FORM

ALBERTA EDUCATION

Version 2.0

DESCRIPTION

Disk Title: _____
Publisher: _____
Subject: _____ Target Audience: _____
Topics: _____ Components: _____ Cost: _____
_____ _____
_____ _____
_____ _____

System Requirements: (Beyond 48K, Applesoft, 1 disk Drive, DOS 3.3., B&W Monitor)

_____ _____
_____ _____

IMPLEMENTATIONAL SUPPORT DESCRIPTION

Describe the entry competencies (if any) (Guidebook, page 18)

Describe the management system (if any) (Guidebook, page 18)

Describe the teacher documentation (Guidebook, page 19)

Describe the user support materials (if any) (Guidebook, page 19)

IMPLEMENTATIONAL SUPPORT EVALUATION (Guidebook, page 19)

OBJECTIVES DESCRIPTION (Guidebook, page 20)

PROGRAM EVALUATION FORM

ALBERTA EDUCATION

Version 2.0

PROGRAM NAME(S): _____ **TARGET AUDIENCE(S):** _____

_____ _____

PEDAGOGICAL CONTENT DESCRIPTION (Guidebook, page 4)

PEDAGOGICAL CONTENT EVALUATION (Guidebook, page 5)

INSTRUCTIONAL FORMAT DESCRIPTION

Describe the student interaction in the program: (Guidebook, page 8)

Describe the questioning techniques in the program: (Guidebook, page 9)

Describe the feedback techniques used in the program: (Guidebook, page 9)

Describe the evaluation techniques used in the program: (Guidebook, page 10)

Describe the branches available in the program: (Guidebook, page 10)

Describe the types of control in the program: (Sequence, Rate, Amount) (Guidebook, page 10)

INSTRUCTIONAL FORMAT EVALUATION (Guidebook, page 11)

TECHNICAL CHARACTERISTICS DESCRIPTION
(Guidebook, page 15)

TECHNICAL CHARACTERISTICS EVALUATION (Guidebook, page 15)

OBSERVATIONS OF STUDENT USERS (Guidebook, page 16)

Name of Evaluator: _____

EVALUATION OF THE OBJECTIVES OF THE DISK (Guidebook, page 21)

SUMMARY EVALUATION OF THE PEDAGOGICAL CONTENT OF THE DISK
(Guidebook, pages 5 and 23)

SUMMARY EVALUATION OF THE INSTRUCTIONAL FORMAT OF THE DISK
(Guidebook, pages 11 and 24)

SUMMARY EVALUATION OF THE TECHNICAL CHARACTERISTICS OF THE DISK
(Guidebook, pages 15 and 24)

SUMMATION: Major Strengths and Weaknesses (Guidebook, page 22)

SUGGESTIONS TO THE PRODUCER (Guidebook, page 22)

RECOMMENDATION

_____ This disk should be evaluated further to determine if authorization as a "PRESCRIBED" Learning Resource is warranted.

_____ This disk should be evaluated further to determine if authorization as a "RECOMMENDED" Learning Resource is warranted.

_____ This disk should be evaluated further to determine if authorization as a "SUPPLEMENTARY" Learning Resource is warranted.

_____ This disk should be returned to the publisher.

I agree that the copyright to this report rests with Alberta Education and confirm that no attempt was made to copy or modify the program or the accompanying documentation.

Name of evaluator: _____

Date: _____

Signature: _____

This evaluation was done for internal purposes only. It is not to be reproduced in part or in whole without the express written permission of Alberta Education.

7. Is the feedback effective?

- Are user inputs accurately evaluated as right or wrong?
- Does learning take place regardless of the student's response? For example, positive feedback can reinforce while negative feedback corrects.
- Does the feedback distinguish between a wrong answer or the wrong format?
- Is the feedback non-threatening, immediate and positive? Is the program "user-sensitive"?
- Is the feedback corrective where necessary?
- Is the feedback relevant to a student's history of responses?
- Are traps set to catch both format and knowledge errors?
- Does the feedback explain why a response is wrong?
- Are cues or prompts used after a wrong response?
- Is the feedback to a wrong response unnecessarily attractive?
- Can the user/teacher control the feedback (e.g. type, amount, when given)?
- Can the user compare his/her response to the correct answer?
- Does the feedback remain on the screen for an appropriate amount of time?
- Is the feedback personalized?
- Is the feedback randomized where appropriate?
- Is the feedback placed on the screen appropriately? consistently?
- Is the feedback boring, repetitive, time consuming or unnecessarily detailed?
- Is negative feedback made inappropriately public through the use of sound?
- Is quantitative feedback available where necessary?
- Does quantitative feedback provide the user/teacher with useful, understandable information?

Evaluation

8. Are pre-tests/post-tests appropriately present/absent?

9. If present, are tests appropriate to the target audience?

- Are the criteria for success appropriate for the ability/skills of the intended user?
- Can the teacher set such criteria?

10. If present, are the evaluation techniques effective?

- Does the test measure the user's achievements on all the intents?
- Does the test content accurately reflect the content of the material?

- Do test results provide sufficient information to the user/teacher (e.g. breakdown of scores by objectives) to enable efficient followup?

Branches

11. Are branches appropriately present/absent?

12. If present, are the branches appropriate for the target audience?

13. If present, are the branches effective in accommodating individual differences? Should there be more? Should there be less?

- Are entry/exit points effectively controlled? (e.g.: based on user success or lack of success, user volition, teacher discretion, etc.)

Types of Control

14. Does the teacher/user have an appropriate amount of control over the program?

- Where desirable, does the teacher have control over features other than sequence, rate and amount? (E.g. imposition or alterability of timed input, type of feedback, randomization of feedback, feedback content, mastery level, speed of character generation, content of the pre-test and post-test, addition and/or adaptation of content units, recording of scores.)

15. Are control features which are present effectively designed?

- Does the user have control of the program where appropriate? E.g. Can the student choose the path(s) (s)he wishes to follow?
- If teacher/user control is available, are such features easily implemented? Are default options available?

C. TECHNICAL CHARACTERISTICS

Technical characteristics sections focus on the program's output as well as on its 'user friendliness'. To be described are such features as displays, special features (e.g. color, sound and graphics) and ease of use.

Effective screen DISPLAYS are needed to allow the user to learn the pedagogical content described earlier. Examples of poor displays are incorrect grammar, spelling and punctuation, inappropriate character size, excessive amounts of information crammed into each screen display and insufficient spacing between lines of text.

Effective use of COLOR, GRAPHICS and SOUND can be important in motivating the user and adding to his/her understanding of the content. However, these features should be integral to the design of the program such that their absence would seriously limit the program's usefulness in the classroom. Unfortunately, these features are often used solely to add 'cute' positive feedback and their inclusion is less than helpful.

Common problems include generation of graphical rewards that are time consuming and which become boring and unmotivational with repeated use; sound that distracts and/or draws attention to a user's errors; ineffective depiction of an object/idea (e.g. a heart made up of low resolution rectangles).

STUDENT EASE OF USE is important if the program is to be effective in the classroom. Programs which are difficult for the user to operate create problems in the classroom as the teacher is constantly being asked for help. Alternatively, the student can become frustrated with trying to find his/her way through the program and will fail to achieve the objectives. Examples of poor programs include those that provide no screen instructions on use, provide no indication to the user as to where (s)he is in the program, do not allow easy exit and require more attention from the user in operating the program than in actually learning the content.

TECHNICAL CHARACTERISTICS DESCRIPTION — Write narrative statements that will describe the type and size of print used. Explain the extent to which color, sound and graphics are used. (Indicate if the evaluation was done without a color monitor.)

TECHNICAL CHARACTERISTICS EVALUATION — Write narrative statements which will evaluate the technical characteristics described earlier. The following questions are provided to assist you in supplying evaluative comments.

Displays

1. Are displays appropriate for the target audience?

   - Is character size appropriate?
   - Is the font appropriate?
   - Are upper and lower case letters used where appropriate?

2. Are displays effective?

   - Are they free from grammar, spelling, punctuation and hyphenation errors?
   - Are characters well formed?
   - Is the amount of material presented at one time appropriate? Is it too lengthy or wordy?
   - Is the material clear and easy to read? Is there adequate spacing for clarity?
   - Are message design principles used to place emphasis on the important concepts? Are paging and/or selective erasing used appropriately?
   - Is the transition between displays effective?
   - Are special features such as flash, inverse, scrolling, split screen, etc. used appropriately and effectively?
   - Is there a clear indication when and where input is required?

- Are text screens presented at an appropriate rate?
- Are text screens erased at a rate so that the user is given an appropriate amount of time to read and absorb the information?
- Does the program accept both upper and lower case inputs or does the program provide capitals where necessary?
- Can the user review previous screen displays?
- Is text protected by "word wrap"?

Color
Graphics
Sound

3. Are color, graphics and sound appropriate for the target audience?

4. Are color, graphics and sound used effectively? Does their use add to or detract from the effectiveness of the instruction?

- Are they used appropriately for the content?
- Are they appropriately mixed with text so as to give variety to the presentation?
- Is the use of these features motivational?
- Will the sound distract others in the classroom? Can it be suitably controlled?
- If color is present, will the program be effective on a monochrome monitor?
- Do the graphics effectively portray the intended object/idea?
- If animation is present, does it add to or detract from the effectiveness of the instruction?

Ease of Use

5. Can the intended user easily and independently operate the program?

- Does the operation of the program interfere with the user's concentration?
- Is the user aware of where (s)he is in the program? (e.g. question number, page headings)
- Can the user exit from the program, return to the menu or move to another section easily when necessary?
- Can the user exit from the program and, if appropriate, return to that point later?
- Are instructions/help avenues available at appropriate points in the program and are they appropriate for the target audience?
- Is the program reliable and bomb-proof under normal use?

D. OBSERVATIONS OF STUDENT USERS

Summarize the results of student use of the program. This could indicate the evaluator's observation of the user(s) as well as comments and observations made by the user(s). Ensure that the test group is adequately described.

III. DISK EVALUATION FORM

A. DESCRIPTION

This section contains brief descriptive data on the product for the information of evaluators. This information and additional descriptions on the formal reports are entered by Clearinghouse staff.

Title	The title of the program, disk or series.
Publisher	Name of the company publishing the product.
Subject	Subject area, e.g. math, science, language arts.
Target Audience	Age, grade level or other ability level descriptors of the target audience for which the package has been designed or would be appropriate.
Topics	Subject area topics included in the package.
Components and Costs	The physical components of the package, i.e. disk(s), guide(s), etc. plus the package/component costs.
System Requirements	The hardware or software that is required beyond the standard package of 48K, 1 disk drive, 3.3 DOS and a monochrome monitor.

B. IMPLEMENTATIONAL SUPPORT

The IMPLEMENTATIONAL SUPPORT section focuses on the materials and management functions that are available to the teacher who wishes to implement the program. Descriptions in this section summarize any prerequisite skills, the scope of any management functions and the content of any teacher documentation and/or user support materials. The evaluative comments focus on the ease with which the package can be implemented in the classroom.

An effective MANAGEMENT SYSTEM will efficiently and accurately track student progress and will provide the teacher with important information that will enable him/her to modify the student's program. Common problems are:

- providing scorekeeping with only the most recent score recorded;
- having limited capacity: e.g. a capacity of '50' may in fact be 50 scores, not 50 students;
- storing cumulative percentages only and not giving any information on the number of questions attempted or the history of attempts;
- not providing any diagnosis or prescription;
- making the system difficult to understand and master;
- making the system difficult to use in the classroom;
- not making records alphabetical and modifiable.

Sufficient detail in the TEACHER DOCUMENTATION can ease the difficulty of implementation by providing the teacher with necessary information on the package as well as by providing advice on its use. An important ingredient in the assessment is a statement on whether the support materials are sufficient as well as an evaluation of the quality of those that are present. Another aspect to the ease of using a package in a classroom is the amount of learning/interaction that is going to be required from the teacher. Some educational software packages, just because of their design complexity, require extensive preparation by the teacher and frequent supervision during use. An evaluative statement assessing the difficulties that the teacher is going to have while using the software is useful information for prospective buyers.

Providing USER SUPPORT MATERIALS such as drill sheets, workbook activities, additional reading, etc. can also ease the implementation of a package in the classroom. Evaluative comments focus again on whether sufficient materials have been provided as well as on whether those which are available are integral to the design of the package.

IMPLEMENTATIONAL SUPPORT DESCRIPTION — Write narrative statements which will describe the following aspects of implementational support.

Entry Competencies — Describe any special prerequisites that are beyond the normal grade level skills.

Describe also any student activities that should be completed prior to beginning the work on the disk.

Indicate if the programs on this disk are prerequisites for other programs on the disk or for programs on other disks in the series.

Management System — Describe the functions available in the management system. These may include:

1. **Class lists:**
   e.g. initiating, maintaining, adding to, deleting from;

2. **Reports:**
   e.g. by individual student, by class, by specific unit;

3. **Prescription:**
   e.g. prescription of specific assignments or a range of assignments for individuals or for the class;

4. **Diagnosis:**
   diagnosis of a student's weaknesses;

5. **Security:**
   passwords, etc.

6. Option of use:
   Does the teacher have the option of using the program as an unmanaged activity for any student?

Also, describe the capacity. How many students can be kept in one class list? How many scores can be kept for one student? How many classes can be kept?

Teacher Documentation

Describe the contents of the documentation (both on the disk and on associated print materials). The documentation may include any of the following:

- instructional objectives;
- suggested grade, age or ability levels;
- required reading level and other prerequisite skills;
- field test results;
- rationale;
- strategies for integration;
- suggested pre-activities and/or post-activities;
- explanation of management system/special control features;
- sample program run;
- content scope and sequence;
- program operating instructions.

User Support Materials

Describe the extent of any STUDENT materials such as pre-instruction activities, work sheets, follow-up activities, etc. Indicate if the materials are integral to the design of the package or if they are optional.

IMPLEMENTATIONAL SUPPORT EVALUATION

Write narrative statements which will evaluate the implementational support described earlier. The following questions are provided to assist you in supplying evaluative comments:

Entry Compentencies

1. Are the entry competencies which have been provided in the package appropriate for the target audience?

2. Have all the entry competencies which are required by the target audience been identified?

Management System

3. Do the functions work as described?

4. Is the system effective in meeting the needs of the teacher?

5. How easy is the system to set up and use?

6. Is the capacity sufficient?

7. Are data easily and effectively collected?

Teacher Documentation

8. Does the documentation contain all the features needed to make this program easy to use in the classroom?

9. Is the documentation well laid out and easy to use?

User Support Materials

10. Are user support materials appropriate for the target audience?

11. Are user support materials effective?
    - Do they contribute to the learning process?
    - Are these materials sufficient?

Ease of Implementation

You should also consider the manner in which the disk can be used in the classroom. Some questions to be addressed are:

12. Is the disk adaptable to a variety of classroom learning environments?

13. Does the disk require a minimal amount of equipment manipulation?

14. Can the disk be used by a teacher with a minimum of computer competency?

15. Do the students require a minimum amount of teacher supervision when using the program?

16. Are error handling and identification procedures sufficiently detailed so that a teacher can help a student?

17. Are excessive additional demands placed on the teacher's time to learn to use the package and to operate it within a classroom setting?

C. OBJECTIVES

Much of the evaluation of a courseware package is a determination of whether the program meets its intents. As such, stated OBJECTIVES are a very necessary part of the courseware documentation. Unfortunately, a common fault with much of the educational software currently on the market is either the complete absence of stated progam objectives or the lack of specificity in their statement. Evaluation statements should first address the manner in which the objectives are presented and then comment on whether the objectives were reasonable in view of the target audience, the medium chosen and the design of the program.

Description — List the objectives that the program is intended to achieve and indicate if they are stated or inferred.

Objectives are the behaviours that the learner manifests as a result of involvement with the materials. The evaluator should ask himself what it is the learner will be able to do after using these materials.

Example: Given line drawings of geometric figures (circle, ellipse, square, rectangle, parallelogram, triangle and diamond), presented in a straight line, four at a time, (three identical, one different; randomly located), the learner will indicate which one is different. Given three trials where each figure is compared with each of the others, the learner should obtain at least two out of three correct for each figure and no less than 50 out of 60 correct for all figures.

Example: Given a number of random representations of various objects, (e.g. a hand, shoe, pencil or book) shown over or under a referent object, the learner will indicate if the object is "over" or "not over" the referent object.

Evaluation — Write narrative statements which will evaluate the objectives described earlier. The following questions are provided to assist you in supplying evaluative comments.

1. Are the developer's objectives clearly stated?
2. Are they appropriate to the target audience?
3. Are they appropriate to the medium?
4. Will satisfactory completion of the program result in their fulfillment?

D. DISK EVALUATION SUMMARIES

Evaluative statements in this section cover the entire disk. If two or more Program Evaluation Forms have been completed, this section will include summaries of the evaluative comments made on those forms. If only one Program Evaluation Form has been completed, the reader should be referred to evaluation statements made on that form.

Disk Pedagogical Content - see page 5 of this guidebook.
Disk Instructional Format - see page 11 of this guidebook.
Disk Technical Characteristics - see page 15 of this guidebook.

E. SUMMATION

Summarize the strengths and weaknesses of the disk. Considering the comments made in the sections above, what is your evaluation of the entire disk?

F. SUGGESTIONS TO THE PRODUCER

Indicate, in priority order, the changes that the producer could make in order to improve the quality of the diskette. The suggestions should be specific. Comments such as "The package should be redesigned" or "Improve the motivational aspects of the material" are of little use to the producer and should be avoided.

G. RECOMMENDATION

Check one recommendation. See the guidelines for making recommendations on page 23 of this guidebook.

IV. GUIDELINES FOR MAKING RECOMMENDATIONS

There are no hard and fast rules with which to equate the strengths and weaknesses of a disk to "the correct recommendation". Recommendations are subjective and will vary from one evaluator to another. We hope that the degree of variance will be small and that the process of synthesizing three evaluations will minimize any differences that might occur.

However, to keep these variances small and to strive for consistency across subject and grade levels, it is advantageous to consider some guidelines.

Within this instrument, there are two questions which have been addressed in almost every evaluation section:
1. the appropriateness to the target audience, and
2. the effectiveness in meeting the intents of the program.

A program that is ineffective should be rejected. On the other hand, a program which is inappropriate to its target audience may still be effective with another target audience and could be considered for limited use (supplementary) in the classroom.

What makes a program ineffective or inappropriate? Certainly the degree of the weakness has to be considered. A program should not be rejected because of a minor flaw. The number of weaknesses should also be considered and a program with 4 or 5 minor flaws may have its use restricted because of the cumulative effects of small weaknesses.

Major flaws are those which seriously hinder the learning that is supposed to take place in a program. They are generally in the areas of "pedagogical content" and "instructional format". Minor flaws are those which may slightly detract from the program's effectiveness. They are generally in the area of "technical characteristics" or are weaknesses in meeting the needs of the specified users. One minor flaw by itself however is not necessarily cause for a lower rating.

The following may be considered as 'major flaws' in a tutorial or in a drill and practice program. Programs which have any one of the features described below should be carefully considered if advancement is contemplated. Only in exceptional cases should programs which have any two of these weaknesses be advanced.

PEDAGOGICAL CONTENT

1. The pedagogical content is outside of the Alberta curriculum.

2. The program attempts to cover too much in one sitting.

3. Incremental steps within the sequence are too large for the intents of the program and the target audience.

4. The sequence from easy to hard and/or from concrete to abstract has not been sufficiently developed (for developmental as opposed to review programs).

5. There is no instructional component or there is insufficient detail in the instruction (for programs where this need is appropriate).

6. There is insufficient practice.

7. The program lacks clarity (terminology, reading levels, levels of abstractions, etc.).

8. The content is inaccurate.

INSTRUCTIONAL FORMAT

9. Students read too much and/or interact too little with the program.

10. Question randomization (where necessary for the intents of the program) is ineffective.

11. User inputs are not accurately evaluated as right or wrong.

12. There is insufficient assistance given as part of the negative feedback.

13. The user/teacher does not have appropriate control over the program.

TECHNICAL CHARACTERISTICS

14. The disk has programming errors.

IMPLEMENTATIONAL SUPPORT

15. The program is excessively difficult for the teacher to implement within a classroom situation.

V. DEFINITIONS

PRESCRIBED LEARNING RESOURCES are those "learning resources authorized by the Minister as being **most** appropriate for meeting the majority of goals and objectives for **courses**, or **substantial components of courses**, outlined in provincial Programs of Study".

RECOMMENDED LEARNING RESOURCES are "those learning resources authorized by Alberta Education because they complement Prescribed Learning Resources by making an **important** contribution to the attainment of one or more of the **major goals** of courses outlined in provincial Programs of Study".

SUPPLEMENTARY LEARNING RESOURCES are "those additional learning resources authorized by Alberta Education to **support** courses outlined in the provincial Programs of Study by reinforcing or enriching the learning experience".

This category should not be a dumping ground for all courseware that is less than "Recommended". Courseware in this category should still be effective, it should meet the needs of some target audience (perhaps not the target audience specified) and it should support some of the goals of the curriculum. The range of potential use of the courseware may be limited, but what it does cover, it should cover effectively.

VI. GLOSSARY OF TERMS

In the fields of microcomputers and education, terminology can be misinterpreted. So that everyone using the Guide will interpret words in the same way, a brief glossary is provided below. Each definition conforms to some standard use of the term but is not necessarily a composite of all uses nor the most common use.

Content	Facts, terms, ideas, concepts, principles, theories and constructs which make up the subject matter of an instructional package.
Courseware	Software and printed material which support instruction in a complete course of study or a definite subset of a course. In this sense, it is not required that all instructional activities be supported by the package or that the tutorial mode of instruction be employed. Even a 30 minute student activity aimed at one objective can be courseware in this definition.
Documentation	Written material for the teacher to use with the computer program (also called a support booklet).
DOS	"Disk Operating System", an operating system which includes the capability of controlling and coordinating the functions of a disk drive within a computer system.
Drill & Practice Mode	A type of computer program which acts as drillmaster by providing repetitive practice on a skill or set of facts. The mode assumes that instruction in the concept skill or process has already been given. Ideally a drill and practice program should: 1) provide random selection of exercises; 2) record student progress; 3) tailor instructions, exercises and feedback to the individual; and 4) offer corrective feedback upon the input of incorrect responses.
Games	Programs in the instructional gaming mode call upon the user to apply one or more specific skills or concepts within a "game" environment. The game dimension of the environment includes the conditions of competition with self or others, specific (if arbitrary) rules, the need to develop a winning strategy and the introduction of random events to force revision of strategies. The instructional dimension of the environment demands that the development both of identifiable subject matter skills or concepts and of general problem solving skills be the goal of the exercise.
Graphics	Images displayed on a video screen or printer which are generated by a computer program.

Hardware	Equipment, including computers, disk drives, cassette players, cables and monitors.
Materials	Books, folders, envelopes, worksheets and similar items. "User Support Materials" are items which support the activity of a person using a computer program.
Microcomputer	A computer system, including peripheral hardware such as disk drive and monitor, based on a microprocessor (or "chip") and having a typewriter-like keyboard.
Package	One or more computer programs with related materials and the storage medium.
Problem Solver	A type of computer program which processes data for a student defined problem.
Program	A computer program, written in Basic, Pascal, machine code or other computer programming language. The routines and operations which instruct the computer constitute a program.
Simulation	Programs in the simulation mode attempt to represent key aspects of some environment within which the user will experience the necessity of making decisions and will be informed of the results of his decisions without experiencing the real consequences of possible misjudgements. Simulations are appropriate in situations where actual experience is ruled out due to extreme expense, safety consideration or the time required for the actual experience. Simulations include problem solving tasks (e.g. diagnosis of illnesses, genetic experiments, testing theoretical models), procedural tasks (e.g. acid titration, blasting, breeding organisms), or performances (e.g. control of water pollution).
Software	Computer programs, including courseware, operating systems and languages.
Tutorial	For programs in this mode, the computer assumes the total responsibility for instruction. Tutorials are characterized by a dialogue between the student and the computer in which the direction and the level of the dialogue are shaped by the student's input. Ideally, tutorials should tailor and present instruction to the individual, introduce new concepts, provide exercises and tests, monitor student responses, give immediate reinforcement and corrective feedback, and keep records.

Some definitions in this glossary have been taken from Evaluator's Guide published by MicroSIFT and The Computing Teacher.